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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/783,377	02/13/2001	Vladimir M. Segal	30-5022(4015)	2320

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David G Latwesen
Wells St. John
601 West First Avenue
Suite 1300
Spokane, WA 99201

EXAMINER	
MORILLO, JANELL COMBS	
ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 01/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/783,377	SEGAL ET AL.	
	Examiner	Art Unit	
	Janelle Combs-Morillo	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-28,32-37 and 40-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-28,32-37 and 40-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 7/1/04
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 21, 22, 32-37, 40-43, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunlop et al (US 5,809,393 A) in view of Xu et al. (US 6,451,179) and "Aluminum and Aluminum Alloys" p 639 (as a teaching reference).

Dunlop teaches (col. 4 lines 28-33) sputtering targets comprising aluminum and up to 10wt% of Cu, Si, Zr, Ti, W, Pt, Au, Nb, Ru, Sc, Co, Mo, Hf, and mixtures thereof. This range includes applicant's claimed range of 1000ppm or less, and Dunlop provides examples (col. 8 line 16 and Fig. 3 and 4) or additions as low as 0.5 wt%, which is approximate to that of applicant's claimed invention. Dunlop et al. also teaches (col. 4 lines 16-21) grain sizes of less than 20 microns for aluminum sputtering targets.

With regards to claims 21, 35, 41, and 43, wherein the aluminum has a purity of at least 99.999at%, Dunlop does not specify the purity of the aluminum used in the sputtering targets. However, purer forms of known products may be patentable, but the mere purity of a product, by itself, does not render the product unobvious. Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989).

Additionally, Xu et al teaches (claim 8, col. 2 lines 55-62) using 99.999% pure aluminum in sputtering targets, and teaches that using aluminum of such purity is useful for preventing the

dewetting layer, which improves coverage of the sputtered layer and reduces the formation of voids in the overlayer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum of 99.999% purity as taught by Xu et al in the sputtering target of Dunlop et al in order to prevent dewetting of the wetting layer, improve coverage of the sputtered layer, and reduce the formation of voids in the overlayer.

With regard to the amended dopant markush group of Ac, As, B, Ba, Bi, C, Ca Cd, etc. the examiner points out that the instant range of these elements is "greater than 0 ppm to less than or equal to 1000 ppm". Though Dunlop does not mention said elements, several of these elements are commonly present in high purity aluminum in the range of a couple ppm or less- namely, As, Bi, C, Ca, Dc, Ge, In, N, O, P, Pb, S, Sb, Sn, and Zn are mentioned in ranges that fall within the presently claimed range in Table 1 of "Aluminum and Aluminum Alloys" p 639.

Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05. It would have been obvious to one of ordinary skill in the art to select any portion of the range, including the claimed range, from the broader range disclosed in the prior art, because the prior art finds that said composition in the entire disclosed range has a suitable utility.

Concerning the process step of casting recited in instant claim 32, it is well settled that a product-by-process claim defines a product, and that when the prior art discloses a product substantially the same as that being claimed, differing only in the manner by which it is made, the burden falls to applicant to show that any process steps associated therewith result in a product materially different from that disclosed in the prior art. See MPEP 2113, *In re Brown*

(173 USPQ 685) and *In re Fessman* (180 USPQ 524) *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Concerning claim 34, which recites the target is monolithic, Dunlop et al shows (Figs. 6-8) a process wherein a monolithic target is worked. The disclosure of Dunlop et al. is primarily directed towards the production of monolithic targets.

Concerning claim 35, wherein the target is made by a process including ECAE, Dunlop teaches (col. 3 lines 39-51) creating sputtering targets using ECAE.

Concerning claim 33, Dunlop does not teach making the sputtering target having a size ≥ 890x910x19 mm^3. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a sputtering target of the size necessary for its intended use. Change in size is insufficient to distinguish the claimed invention from the prior art. See In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955), MPEP 2144.04 IV. Also, there is no suggestion in Dunlop et al that the prior art disclosure would not be functional for any sputtering target size.

Concerning dependent claim 46, as stated above, the combination of Dunlop, Xu, and "Aluminum and Aluminum Alloys" teaches an alloy with an overlapping range of Ge.

3. Claims 23-28 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunlop, Xu, and "Aluminum and Aluminum Alloys" alone, or in view of Takashima (US 2002/0014406 A1), as applied to claims above.

As stated above, Dunlop and Xu teach a sputtering target processed substantially as claimed and with a substantially overlapping alloy composition and grain size. Because of the broad overlap, and because applicant has not shown specific unexpected results with regard to

the instant alloying ranges, it is held that Dunlop and Xu have created a prima facie case of obviousness of the presently claimed invention. Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05, *In re Best* 195 USPQ 430, *In re Malagari*, 182 USPQ 549, *In re Titanium Metals Corporation of America v. Banner*, 227 USPQ 773 (Fed. Cir 1985), *In re Woodruff*, 16 USPQ 2d 1934, and *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Alternatively, the examiner points out that Takashima teaches (see paragraph [0042] and claim 1) an Al-based target material comprising substantially pure Al and 0.01-10at% of at least one intermetallic compound forming element (such as Sc, Ti, Hf, etc.), which overlaps the presently claimed alloying ranges, in order to prevent hillock formation see [0043]. It would have been obvious to one of ordinary skill in the art to use a low alloying amount of an intermetallic compound forming element (such as Sc, Ti, Hf, etc.), as taught by Takashima, for the (broad) aluminum sputtering target taught by the combination of Dunlop and Xu, in order to prevent hillock formation (see Takashima at [0043]).

4. Claims 21-28, 32-37, 40-44, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunlop et al (US 5,809,393 A) in view of Ueda et al (US 5,541,007) and "Aluminum and Aluminum Alloys" p 639 (as a teaching reference).

As stated above, Dunlop teaches (col. 4 lines 28-33) sputtering targets comprising aluminum and up to 10wt% of Cu, Si, Zr, Ti, W, Pt, Au, Nb, Ru, Sc, Co, Mo, Hf, and mixtures thereof. This range includes applicant's claimed range of 1000ppm or less, and Dunlop provides examples (col. 8 line 16 and Fig. 3 and 4) or additions as low as 0.5 wt%, which is approximate to that of applicant's claimed invention. Dunlop et al. also teaches (col. 4 lines 16-21) grain sizes

of less than 20 microns for aluminum sputtering targets, which overlaps or is a close approximation of the presently claimed grain size range.

With regard to the amended dopant markush group of Ac, As, B, Ba, Bi, C, Ca Cd, etc. the examiner points out that the instant range of these elements is "greater than 0 ppm to less than or equal to 1000 ppm". Though Dunlop does not mention said elements, several of these elements are commonly present in high purity aluminum in the range of a couple ppm or less- namely, As, Bi, C, Ca, Dc, Ge, In, N, O, P, Pb, S, Sb, Sn, and Zn are mentioned in ranges that fall within the presently claimed range in Table 1 of "Aluminum and Aluminum Alloys" p 639.

Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05. It would have been obvious to one of ordinary skill in the art to select any portion of the range, including the claimed range, from the broader range disclosed in the prior art, because the prior art finds that said composition in the entire disclosed range has a suitable utility.

Concerning the process step of casting recited in instant claim 32, applicant has not shown that the instant product materially different from that disclosed in the prior art (see above discussion). See MPEP 2113.

With regards to claims 21, 35, 41, and 43, wherein the aluminum has a purity of at least 99.999at%, Dunlop does not specify the purity of the aluminum used in the sputtering targets. However, purer forms of known products may be patentable, but the mere purity of a product, by itself, does not render the product unobvious. Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989).

Additionally, Ueda et al teaches (col. 2 lines 55-62) using > 99.99% pure aluminum in sputtering targets (such as 99.999% column 5 line 1), and teaches that using aluminum of such

purity is useful for creating sputtering targets with low resistivity, good connection properties, and low voids (column 6 lines 1-7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum of 99.999% purity as taught by Ueda et al in the sputtering target of Dunlop et al in order to creating sputtering targets with low resistivity, good connection properties, and low voids (column 6 lines 1-7), and because Dunlop teaches a broad range of aluminum alloy compositions can be processed by said method of ECAE.

Concerning claim 34, which recites the target is monolithic, Dunlop et al shows (Figs. 6-8) a process wherein a monolithic target is worked. The disclosure of Dunlop et al. is primarily directed towards the production of monolithic targets.

Concerning claim 35, wherein the target is made by a process including ECAE, Dunlop teaches (col. 3 lines 39-51) creating sputtering targets using ECAE.

Concerning claim 33, Dunlop does not teach making the sputtering target having a size $\geq$ 890x910x19 mm^3. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a sputtering target of the size necessary for its intended use. Change in size is insufficient to distinguish the claimed invention from the prior art. See In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955), MPEP 2144.04 IV. Also, there is no suggestion in Dunlop et al that the prior art disclosure would not be functional for any sputtering target size.

Concerning claims 23-25 and 44, Ueda teaches an aluminum alloy composition consisting of 100ppm-1wt% Sc balance aluminum (see abstract), which is a close approximation of the presently claimed "less than 100 ppm... Sc". Because Dunlop teaches a broad range of

aluminum alloy compositions can be processed by said method of ECAE, and because Ueda teaches that said Al-Sc alloy composition is suitable for sputtering targets with low wire breakage (column 2 lines 3-9), it would have been obvious to one of ordinary skill in the art to combine the disclosures of Dunlop and Ueda.

Concerning dependent claim 46, as stated above, the combination of Dunlop, Ueda, and "Aluminum and Aluminum Alloys" teaches an alloy with an overlapping range of Ge.

5. Claims 21, 32-34, 40-43, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Legresy et al (US 5,160,388) in view of "Aluminum and Aluminum Alloys" p 639, as a teaching reference.

Legresy teaches a high purity (>99.99%, see column 1 lines 58-59) fine grain size (50-80 μm, see column 3 lines 48-49) aluminum alloy sputtering target with 0.05-2% Si balance aluminum (see claim 1). The examiner points out that 0.05% = 500 ppm, which overlaps the alloying ranges in claims 21, 32, 33, 40-43, 45, and 46 of "less than 1000 ppm...Si". Legresy teaches the importance of high purity aluminum- "obviously the aluminum and silicon must be very pure, namely at least 99.99% and in particular the aluminum must be free from impurities producing alpha radiation" (column 1 lines 58-61). Therefore Legresy teaches motivation to provide high purity aluminum >99.99%, such as 99.999%, etc, which falls within the instant alloying ranges.

With regard to the amended dopant markush group of Ac, As, B, Ba, Bi, C, Ca Cd, etc. the examiner points out that the instant range of these elements is "greater than 0 ppm to less than or equal to 1000 ppm". Though Legresy does not mention said elements, several of these elements are commonly present in very high purity aluminum in the range of a couple ppm or

less- namely, As, Bi, C, Ca, Dc, Ge, In, N, O, P, Pb, S, Sb, Sn, and Zn are mentioned in ranges that fall within the presently claimed range in Table 1 of "Aluminum and Aluminum Alloys" p 639. Therefore, it is held that Legresy overlaps the alloy composition in instant claims 21, 32, 33, 40-43, 45, and 46.

Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05. It would have been obvious to one of ordinary skill in the art to select any portion of the range, including the claimed range, from the broader range disclosed in the prior art, because the prior art finds that said composition in the entire disclosed range has a suitable utility.

Concerning the method step of "casting" recited in instant claims 32 and 40, Legresy teaches casting the billets or disks in column 2 lines 12-25.

Because Legresy teaches a substantially overlapping alloy composition (instant claims 45 and 46), as well as a grain size that falls within the instant range, it is held that Legresy has created a prima facie case of obviousness of the presently claimed invention.

Concerning dependent claim 33, Legresy teaches the diameter of the sputtering target is 250 mm and the thickness is reduced to 25 mm, which fall within the instant size range.

Concerning dependent claim 34, in the example on columns 5-6, Legresy teaches a monolithic sputtering target disk.

Concerning dependent claim 46, Legresy combined with "Aluminum and Aluminum Alloys" teaches an overlapping range of Ge.

6. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dunlop et al (US 5,809,393 A) in view of Ueda et al (US 5,541,007) and "Aluminum and Aluminum Alloys" p 88-89.

Neither Dunlop nor Ueda teach the addition of Be to the aluminum alloy. However, "Aluminum and Aluminum Alloys" p 41 teaches that Be is present in amounts of a few ppm to Al alloys, and functions to reduce oxidation (p88-89). It would have been obvious to one of ordinary skill in the art to add Be to the aluminum alloy sputtering target taught by Dunlop because Be (in amounts of a few ppm) is known to reduce oxidation in aluminum alloys.

Response to Arguments

7. In the response filed on November 9, 2004, applicant amended claims 21, 32, 35, 40, and 42, and submitted various arguments traversing the rejections of record.

8. Applicant's argument that the instant minimum of "greater than 0 ppm" is supported by claim 14 as originally filed has been found persuasive.

9. Applicant's argument that the present invention is allowable over the prior art of record because the prior art does not suggest the target is formed by a process of adding a dopant to high purity aluminum has not been found persuasive. With regard to the process steps, it is well settled that a product-by-process claim defines a product, and that when the prior art discloses a product substantially the same as that being claimed, differing only in the manner by which it is made, the burden falls to applicant to show that any process steps associated therewith result in a product materially different from that disclosed in the prior art. See MPEP 2113, *In re Brown* (173 USPQ 685) and *In re Fessman* (180 USPQ 524) *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing

an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292. Applicant has not shown the product taught by the prior art is materially different than the presently claimed product by process.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janelle Combs-Morillo whose telephone number is (571) 272-1240. The examiner can normally be reached on 8:30 am- 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

jcm
January 17, 2005